

What is claimed is:

1. An optical waveguide provided with a refractive-index profile for transmitting light, the optical waveguide comprising:

(a) a main medium; and

5 (b) a multitude of submedia that:

(b1) have a refractive index smaller than that of the main medium; and

(b2) are distributed in the main medium such that the submedia form minute regions each of which exists locally in the cross section perpendicular to the direction of the light travelling in the optical waveguide

10 without extending along the axis of the optical waveguide;

the refractive-index profile being formed based on one member selected from the group consisting of:

(c) the refractive-index profile of the main medium itself;

(d) the numerical distribution density of the minute regions;

15 (e) the individual size of the minute regions; and

(f) the numerical distribution density and individual size of the minute regions.

2. An optical waveguide as defined by claim 1, wherein the main medium is made of one material selected from the group consisting of glass and synthetic  
20 resin.

3. An optical waveguide as defined by claim 1, wherein the submedia are made of gas.

4. An optical waveguide as defined by claim 1, wherein each of the minute re-

gions has a size of at most  $1/10$  the wavelength of the light travelling in the optical waveguide.

5. An optical waveguide as defined by claim 1, the optical waveguide being an optical fiber.

5 6. A method of producing an optical waveguide provided with a refractive-index profile for transmitting light, the method comprising:

(a) a first step for producing an intermediate, the intermediate comprising:

(a1) a main medium; and

(a2) a multitude of submedia that:

10 (a2a) have a refractive index smaller than that of the main medium;  
and

(a2b) are distributed in the main medium such that the submedia form minute regions each of which exists locally in the cross section perpendicular to the direction of the light travelling in the optical waveguide

15 without extending along the axis of the optical waveguide; and

(b) a second step for providing the intermediate with the refractive-index profile for transmitting light.